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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,427	03/09/2004	Mou-Shiung Lin	MEG03-005	1870
7590 09/12/2005			EXAMINER	
STEPHEN B. ACKERMAN 28 DAVIS AVENUE POUGHKEEPSIE, NY 12603			LEWIS, MONICA	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/796,427

Applicant(s)

LIN ET AL.

Examiner

Monica Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 69-79 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 69-79 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>5/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the amendment filed July 19, 2005.

Specification

2. The title of the invention is not **descriptive**. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 69, 70 and 72-74 are rejected under 35 U.S.C. 102(e) as being anticipated by Yanagida (U.S. Patent No. 6,545,355).

In regards to claim 69, Yanagida discloses the following:

a) a semiconductor substrate (10) having multiple semiconductor devices (For Example: See Figure 1);

b) an interconnecting metallization structure (12a) over said semiconductor substrate (For Example: See Figure 1);

c) a passivation layer (14) over said interconnecting metallization structure, wherein an opening in said passivation layer exposes a contact point of said interconnecting metallization structure (For Example: See Figure 1);

d) a first metal layer (20a) over said contact point, wherein said first metal layer comprises aluminum (For Example: See Figure 1); and

e) a second metal layer (24) over said first metal layer, wherein said second metal layer is used to be wire bonded (For Example: See Figure 1) (Note: Applicant disclosed that the "Al cap layer provides the wire-bonding capability for the copper I/O pad" (For Example: See Specification Page 3). The interconnecting metallization structure is comprised of copper and the first metal layer is comprised of aluminum (For Example: See Column 6 Lines 13, 62 and 63). Although Yanagida fails to specifically disclose "wire bonding capability," the same material is utilized in Yanagida as in Applicant's invention therefore it would have the same characteristics.)

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In regards to claim 70, Yanagida discloses the following:

a) passivation layer comprises a topmost nitride layer of said semiconductor chip or wafer (For Example: See Column 6 Line 31).

In regards to claim 72, Yanagida discloses the following:

a) interconnecting metallization structure comprises copper (For Example: See Column 6 Lines 62 and 63).

In regards to claim 73, Yanagida discloses the following:

a) second metal layer comprises gold (For Example: See Column 6 Lines 18-20).

In regards to claim 74, Yanagida discloses the following:

a) second metal layer comprises copper (For Example: See Column 6 Lines 18-20).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagida (U.S. Patent No. 6,545,355) in view of Howell et al. (U.S. Patent No. 6,806,578).

In regards to claim 71, Yanagida fails to disclose the following:

a) a topmost oxide layer of said semiconductor chip or wafer.

However, Howell et al. ("Howell") discloses a semiconductor device that has a topmost oxide layer of said semiconductor chip or wafer (For Example: See Column 3 Lines 35-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Yanagida to include a topmost oxide layer of said

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semiconductor chip or wafer as disclosed in Howell because it aids in providing mechanically and electrically robust interconnections (For Example: See Column 2 Lines 20-34).

Additionally, since Yanagida and Howell are both from the same field of endeavor, the purpose disclosed by Howell would have been recognized in the pertinent art of Yanagida.

6. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagida (U.S. Patent No. 6,545,355) in view of Galloway (U.S. Patent No. 5,783,868).

In regards to claim 75, Yanagida fails to disclose the following:

a) second metal layer has a thickness of between about 2um and 20um.

However, Galloway discloses a semiconductor device that has a gold layer that has a thickness of between about 2um and 20um (For Example: See Column 3 Lines 41-43). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Yanagida to include a gold layer that has a thickness of between about 2um and 20um as disclosed in Galloway because it aids in avoiding damage to the contact area (For Example: See Column 1 Lines 33-67 and Column 2 Lines 1-10).

Additionally, since Yanagida and Galloway are both from the same field of endeavor, the purpose disclosed by Galloway would have been recognized in the pertinent art of Yanagida.

Finally, the applicant has not established the critical nature of a "second metal layer has a thickness of between about 2um and 20um." "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). Therefore, it would

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have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

7. Claims 76-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagida (U.S. Patent No. 6,545,355) in view of Weng (U.S. Patent No. 6,720,243).

In regards to claim 76, Yanagida fails to disclose the following:

a) a third metal layer between said first and second layers, wherein said third metal layer comprises a titanium-tungsten alloy.

However, Weng discloses a semiconductor device that has a third metal layer (208) between said first (206) and second layers (210), wherein said third metal layer comprises a titanium-tungsten alloy (For Example: See Column 3 Lines 30-35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Yanagida to include a third metal layer between said first and second layers, wherein said third metal layer comprises a titanium-tungsten alloy as disclosed in Weng because it aids in providing good bump quality (For Example: See Column 2 Lines 25-65).

Additionally, since Yanagida and Weng are both from the same field of endeavor, the purpose disclosed by Weng would have been recognized in the pertinent art of Yanagida.

In regards to claim 77, Yanagida fails to disclose the following:

a) a third metal layer between said first and second layers, wherein said third metal layer comprises chromium.

However, Weng discloses a semiconductor device that has a third metal layer (208) between said first (206) and second layers (210), wherein said third metal layer comprises chromium (For Example: See Column 3 Lines 30-35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of

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Yanagida to include a third metal layer between said first and second layers, wherein said third metal layer comprises chromium as disclosed in Weng because it aids in providing good bump quality (For Example: See Column 2 Lines 25-65).

Additionally, since Yanagida and Weng are both from the same field of endeavor, the purpose disclosed by Weng would have been recognized in the pertinent art of Yanagida.

In regards to claim 78, Yanagida fails to disclose the following:

a) a third metal layer between said first and second layers, wherein said third metal layer comprises titanium.

However, Weng discloses a semiconductor device that has a third metal layer (208) between said first (206) and second layers (210), wherein said third metal layer comprises titanium (For Example: See Column 3 Lines 30-35). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Yanagida to include a third metal layer between said first and second layers, wherein said third metal layer comprises titanium as disclosed in Weng because it aids in providing good bump quality (For Example: See Column 2 Lines 25-65).

Additionally, since Yanagida and Weng are both from the same field of endeavor, the purpose disclosed by Weng would have been recognized in the pertinent art of Yanagida.

8. Claim 79 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagida (U.S. Patent No. 6,545,355) in view of Chikawa et al. (U.S. Patent No. 5,310,699).

In regards to claim 79, Yanagida fails to disclose the following:

a) a third metal layer between said first and second layers, wherein said third metal layer has a thickness of between 2700 and 3300 Angstroms.

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However, Chikawa et al. ("Chikawa") discloses a semiconductor device that has a titanium-tungsten layer that has a thickness of between 2700 and 3300 Angstroms (For Example: See Column 4 Lines 22-25). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Yanagida to include a titanium-tungsten layer that has a thickness of between 2700 and 3300 Angstroms as disclosed in Chikawa because it aids in providing good adhesion (For Example: See Column 4 Lines 22-25).

Additionally, since Yanagida and Chikawa are both from the same field of endeavor, the purpose disclosed by Chikawa would have been recognized in the pertinent art of Yanagida.

Finally, the applicant has not established the critical nature of a "third metal layer has a thickness of between 2700 and 3300 Angstroms." "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have various ranges.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300 for regular and after final

communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956

ML

September 6, 2005



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